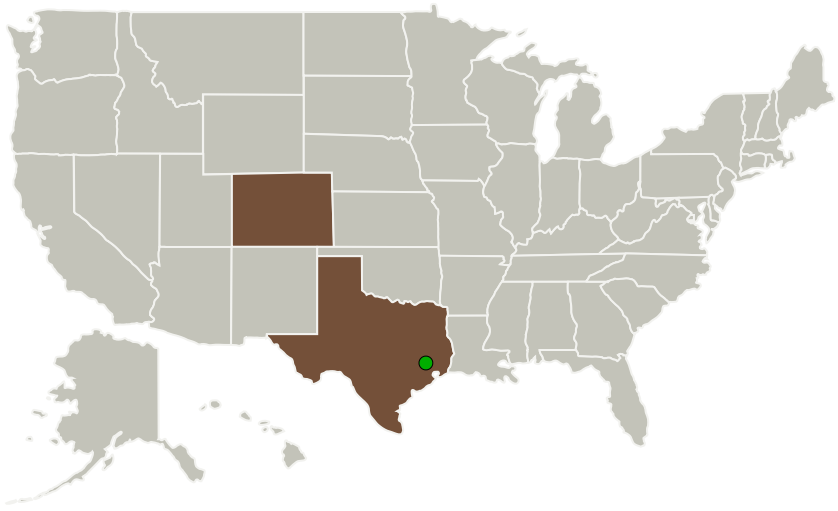
CO2 Removal from Mars EMU, Phase II

Completed Technology Project (2011 - 2013)

Project Introduction

A practical CO2 control system for ExtraVehicular Activity (EVA) on Mars have not yet been developed. TDA Research, Inc. proposes to develop a durable, high-capacity, continuously regenerable sorbent that can remove CO2 from the breathing loop. The energy for regeneration is provided by the metabolic load, and the sorbent can be regenerated at or above 6 torr, eliminating the potential for Martian atmosphere to leak into the regeneration bed and into the breathing loop. In Phase I, we demonstrated the feasibility of the concept in a series of bench-scale experiments and by conducting a preliminary system analysis. We showed the sorbent regeneration can be accomplished with a temperature swing of only 17ºC, The entire system runs at near ambient temperature, and the sorbent can be regenerated at 13 torr (well above the Martian atmospheric pressure). We also performed over 1,000 adsorption/regeneration cycles to demonstrate the life of these sorbents. The major objective in Phase II is to design and fabricate a full-scale breadboard prototype unit to demonstrate the merits of the new technology. We will also improve the sorbent formulation.

Primary U.S. Work Locations and Key Partners



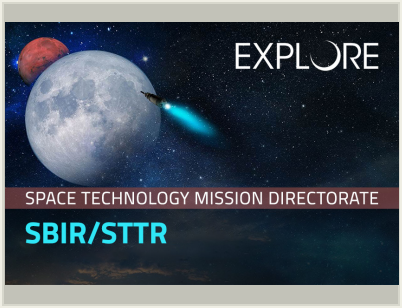


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Table of Contents

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Organizations Performing Work	Role	Type	Location
TDA Research, Inc.	Lead Organization	Industry	Wheat Ridge, Colorado
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Colorado	Texas

Project Transitions

June 2011: Project Start

December 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138742)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TDA Research, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Gokhan Alptekin

Co-Investigator:

Gokhan O Alptekin

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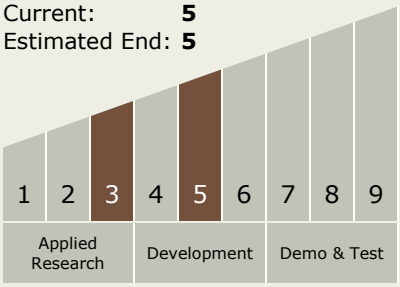
Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.1 Atmosphere Revitalization

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System